

FY09 Progress Report
California Space Grant Consortium (CaSGC)
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CaSGC PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The California Space Grant Consortium (CaSGC) is a Designated Consortium funded at a level of \$785,000 for fiscal year 2009.

CaSGC PROGRAM GOALS

- To develop and maintain a network of institutions of higher education throughout California with interests and capabilities in aerospace science, engineering, and technology.
- To recruit and train aerospace professionals, especially women and underrepresented minorities, for careers in aerospace science and engineering. A primary focus of this effort is student-mentor projects.
- To promote a strong science, mathematics, and engineering education base from elementary through university levels that meets NASA's Education Enterprise established Education Program Operating Principles.
- To encourage interdisciplinary education and training, research, and public service programs related to aerospace.
- To encourage collaborative development programs among universities, industry, and federal, state, and local governments.

CaSGC PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, & 3)

NASA Education Outcome 1: "Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals (Employ and Educate)".

A. CaSGC FY 2009 Fellowship/Scholarship Program

The results for the FY 2009 year show that the CaSGC awarded 177 fellowships and scholarships. The CaSGC has approached its FY 2009 SMART goals of:

- Awarding, at least, 25% (22.6% FY2009 awards to females) of the awards to female students; and
- Exceeding a level of 20% (20.34% FY2009 awards to minorities) for awards to underrepresented minorities.

Funding for this Program Element is derived from multiple sources including NASA Space

Grant. As part of the University of California / Space Grant Center of Excellence program, the UC-wide Office of Research has provided an additional \$400,000 of state funding of which part goes for graduate fellowships. The CaSGC FY2009 SMART goals for participation of underrepresented groups in its STEM scholarship/fellowship awards: (achieved 20.34%) above 20% for minorities and above 25% (underachieved at 22.6%) for females.

In FY 2010, the CaSGC Strategic Plan has been modified to reflect SMART goals for participation of underrepresented groups to correspond to current California higher education demographics: 36% for minorities [7.7% Blacks, 27.6% Hispanics, 0.9% American Indian / Alaska Native] and 56% for females, based on the National Center for Education Statistics [NCES] data for California.

B. CaSGC FY 2009 Higher Education Program

The CaSGC has allocated \$160,903 or 20.5% of the FY 2009 NASA Space Grant funds to the Higher Education Program Element and when combined with other non-federal resources triples to available Higher Education of resources.

CaSGC has worked toward NASA Objective 1.3: Student Involvement in Higher Education by providing funding for student-mentor projects & intern programs that provide hands-on student participation in STEM-related programs & research. In FY 2009, the CaSGC provided two competitive experiential learning opportunities (**Workforce Development Program, Statewide Undergraduate Research Opportunity Program**) that are available to all CaSGC affiliates.

The CaSGC Affiliate Workforce Development Program provides opportunities for CaSGC affiliate undergraduate and graduate students to be placed with NASA, university, and industry mentors while working on various NASA Mission Directorate programs. In FY2009, the CaSGC selected 12 affiliate projects for awards (each award is less than 25% of the total proposed project funds) that were used to support the students' participation in these experiential projects. Each of these participating affiliate campuses has woven these hands-on student efforts with related interdisciplinary science and engineering curricular programs.

The newly formed FY 2009 Statewide Undergraduate Research Opportunity Program (UROP) was implemented in FY2009. The CaSGC UROP provided opportunities to undergraduate students (39 student proposals selected in FY2009) attending CaSGC affiliate institutions (competitively reviewed and selected) for projects that not only engage undergraduate students in world-class aerospace-related research projects but also provide an effective shared resources environment for Space Grant STEM education throughout California.

The FY2009 SMART goals for these opportunities were as follows: 1. Engage all active CaSGC affiliates in these higher education Human Capital Programs; 2. Reach the goals for involvement of underrepresented students in these STEM-related projects; 3. Increase the involvement of MSI affiliate institutions in every aspect of these programs so that at least 80% of MSI affiliates are involved in the programs; and 4. Lead institution management will provide coordination resources in forming partnerships between CaSGC affiliates and NASA Centers. These goals were achieved in FY2009 for these higher education opportunities.

In addition the CaSGC worked toward NASA Objective 1.4: Course Development (STEM disciplines) by developing an effective aerospace learning environment that has both curricular

excellence as well as hands-on skill development. Each of the CaSGC affiliates contributes to both areas throughout California. The CaSGC Strategic Plan, recognizing the breadth and depth of existing aerospace-related science and engineering curricular programs on the affiliate campuses, had set and implemented the following SMART goals for FY2009: 1. Provide funding that creates partnerships between the CaSGC and the affiliate campuses to encourage aerospace-related engineering and science curricular development and dissemination; 2. Provide the facilitation, coordination, and networking management resources for these curricular efforts while continuing to define the aerospace-related university-level educational needs of California and NASA; 3. Emphasize the involvement of MSI affiliates in curricular development and sharing efforts.

C. CaSGC FY 2009 Research Infrastructure Program

The aerospace-related research infrastructure in California is immense (many projects funded by sources other than Space Grant), therefore in FY2009; CaSGC focused its resources (\$32,463 or 4.1% of Space Grant budget vs. \$310,915 non-federal and other federal funds) by forming partnerships with affiliates on coordinating a part of the educational & "Human Capital" aspects of that large & diverse infrastructure.

With this in mind, CaSGC's worked toward the FY 2009 **SMART** goals in the following way: 1. Provided Space Grant funded research Fellowships/Scholarships in partnership with CaSGC affiliates in support of selected research projects; 2. Partnered with the University of California (UC) System on aerospace-related Centers of Excellence; 3. Applied CaSGC management time toward arranging teaming between CaSGC affiliates on NASA Mission Directorate-related research programs; 4. Applied CaSGC management time in arranging research project teaming between CaSGC affiliates and NASA Centers (NASA ARC, DFRC, JSC, JPL) and industry; 5. Coordinated and managed student/mentor and faculty research experience programs at NASA Centers.

The CaSGC has determined that the above coordination & management partnership activities are a productive way to engage CaSGC affiliate institutions, faculty, and students into California's aerospace-related research infrastructure with a relatively small CaSGC budget allocated for this Program Element.

NASA Education Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers and faculty (Educate and Engage)

CaSGC FY 2008 Precollege Education Programs:

Throughout California the CaSGC provided management support and small funding assistance (\$49,669 or 6.3% of Space Grant funds) to affiliate campus Teacher Education & Training and K-12 Programs. The K-12 education and outreach programs within the three large California higher education systems (University of California, California State University, and California Community College Systems) are immense programs serving large K-12 pre-service and in-service teacher populations. State and National Standards for science and math curriculum guide each of these programs and each participates in annual evaluations and assessments. In addition, each of these institutions is carrying out numerous programs that focus on encouraging underrepresented pre-college students (minorities and women) to select STEM careers.

In FY2009, the CaSGC allocated support (both management and a small amount of CaSGC funds) to a number of precollege projects throughout California. Proposal tasks for precollege projects were accepted from CaSGC affiliates within the Workforce Development and STEM Pipeline Affiliate Programs. The CaSGC has set a path for a small precollege involvement (from a NASA Space Grant funding perspective) that has the Consortium playing an aerospace STEM-related coordination and facilitation role (management time) to the organizations on the affiliate campuses that have primary responsibility for precollege curriculum development, teacher education, outreach, and assessment.

The CaSGC has the following definitive set of program objectives for the FY2009 Pre-College Program Element: 1. Provide an active interface between the affiliate institution's pre-service & in-service professional development programs and NASA education and research resources – Starting in FY2009, the CaSGC is taking the lead to coordinate and facilitate the statewide involvement of California in the newly announced *Summer of Innovation* opportunity; 2. Actively partner with affiliate campus programs that focus on encouraging underrepresented pre-college students (minorities and women) to select STEM careers; 3. Partner with and participate in the STEM State and National Standards activities to provide an interface to NASA programs and educational content; 4. Encourage and engage CaSGC Scholarship/Fellowship recipients to partner with K-12 educators in their local communities to entice students to pursue STEM careers; 5. Utilize Pre-college Program metrics that document the number of active programmatic interfaces with affiliate campus programs described in the four areas above.

NASA Education Outcome 3: Informal Education: Build strategic linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire)

The CaSGC provides a small but directed budget (\$31,069 or 3.95% of Space Grant funds) to affiliates for Outcome 3. In FY2009 (under Workforce Development and STEM Pipeline Programs), the CaSGC accepted affiliate Informal Education proposals and provided Space Grant funds. These directed affiliate efforts focused on a definitive set of objectives:

Objective 1: Being a key conduit for Informal Education information between NASA's Research Programs-Missions-Education Offices and the California informal education community to increase learning, educate students, educators and the general public on aerospace-specific STEM content areas, and to expand the nation's future STEM workforce,

Objective 2: To provide aerospace-related content expertise to formal & informal STEM educational environments through Space Grant's network of affiliates.

A primary vehicle utilized by the CaSGC to provide NASA STEM-related content for informal education is through current and engaging Space Grant websites. Although the websites have been useful they do not replace the hands-on events (student – mentor projects) and the community face-to-face interactions at the science centers, museums, and community science events.

CaSGC PROGRAM ACCOMPLISHMENTS

NASA Education Outcome 1 Impacts/Results: Scholarships – Fellowships; Higher Education; and Research Infrastructure

Scholarships/Fellowships: The results for the FY2009 period indicate that the CaSGC awarded 177 fellowships and scholarships. The CaSGC has continued to meet or exceed its 2009 SMART goals of:

- Awarding at least, 25% of the awards to female students; and
- Exceeding a level of 20% for awards to underrepresented minorities.

Higher Education:

As part of the CaSGC Workforce Development program, 12 affiliate proposals for student – mentor projects were competitively reviewed and selected. These 12 selected workforce projects not only support the students’ participation in these experiential efforts but also weave the hands-on student efforts with related interdisciplinary science and engineering curricular programs. **An Example of this is the AUVSI program at UC San Diego. Undergraduate aerospace, electrical, and mechanical engineering students design and build an autonomous unmanned aircraft for a national competition. Engineering students learn how to apply their classroom knowledge to solve system-engineering problems through teamwork. Project is highly successful as a bridge to graduate school and/or industry. Graduates have gone onto to Stanford, MIT, Carnegie Mellon, Northrop, General Atomics and NASA.** CaSGC played a critical role in the creation and continuance of affiliate space science courses (space physics, astronomy, Earth science) and aerospace engineering courses (suborbital rockets and balloons, UAV, and orbital nano- and micro-satellites. An example of

The FY2009 Statewide Undergraduate Research Opportunity Program provided exceptional opportunities to undergraduate students (39 student proposals competitively selected) for projects that not only engage undergraduate students in world-class aerospace-related research projects but also provide an effective shared resources environment for Space Grant STEM education throughout California.

One of the important strengths of the CaSGC Higher Education Program is that with a relatively small budget but with a strong partnership management role, significant impacts/results can be achieved. Each of the CaSGC curricular programs was developed and certified under standards imposed by the California University Systems and national evaluation and certification organizations. The engineering and science departments on the affiliate campuses annually review all curricular programs.

Research Infrastructure: For FY 2009, the qualitative SMART goal for Research Infrastructure was to expand the opportunities for research Fellowship/Scholarships, provide viable interface paths for non-UC affiliates to the UC Centers of Excellence program, and provide management resources in forming research partnerships between the NASA Mission Directorates and California NASA Centers.

The interdisciplinary, aerospace-related partnership programs, facilitated and coordinated by the CaSGC, involving the NASA Centers, industry and the affiliate research universities have been slowed by the economic conditions nationally and in California. The CaSGC Strategic Plan stresses that a combination of a small amount of Space Grant funding and considerably more management time for partnerships is the most effective means to impact the large existing aerospace-related research infrastructure. The CaSGC, through its Research Infrastructure partnerships, has coordinated a unique array of successful aerospace-related programs including:

- **Space Grant/University of California Centers of Excellence (UC Davis – Remote Sensing and Earth Resources; UC Berkeley – Space Physics and Space Operations; UC Santa Barbara – Environmental remote sensing and astrophysics; UC Los Angeles – Planetary and Space Physics; UC Santa Cruz – Adaptive Optics and astronomy/astrophysics; UC San Diego – Climate Change Research (science and engineering) and Space Physics**
- **CaSGC’s Cooperative Research Programs at NASA Centers;**
 - **NASA ARC Space Portal research partnership – Commercial Space Partnerships, International Space Station National Laboratory (<http://spaceportal.arc.nasa.gov>);**
 - **NASA Dryden Flight Research Center – UAV research, Suborbital Remote Sensing research involving MSI affiliates (CSU Los Angeles, CSU Fresno), UC affiliates (UC San Diego, UC Los Angeles, UC Davis), UAV industry in southern California, Los Alamos National Lab, and Department of Defense sponsors.**
- **Rocket Research at CSU Long Beach, San Diego State, University of Southern California, UC San Diego with the aerospace industry (Garvey Space, Flowmetrics, and SpaceX)**
- **Biotechnology Space Research Alliance (BSRA – <http://BSRAportal.org>) Private – public partnership for biotech research on the International Space Station National Lab.**

NASA Education Outcome 2 Impacts/Results: Precollege

The FY 2009 impact of the CaSGC Precollege Education Program is indicated by the quantitative growth (**above 5%**) both in the demand for CaSGC affiliate participation in university and informal education programs and the increase in budget from sources outside Space Grant. The main strength of the program is the extensive network of partnerships the CaSGC has forged with the K-12-related organizations within our affiliate universities, connection to the California Science & Mathematics Projects, and with the California-based NASA Centers. A weakness is that the CaSGC contribution is so small that we have difficulty influencing any of the critical decisions made on professional development of teachers and STEM curriculum. The metrics used to determine the impact of the CaSGC precollege program consists of documenting the number of precollege programs, workshops, partnerships, and participants that the CaSGC affiliates make a significant contribution. A significant contribution is defined as funding support, management support, and/or providing key NASA content and interfaces.

In FY 2009, the CaSGC has given support (both management and a small amount of CaSGC funds) to a number of precollege projects throughout California. The CaSGC has set a path for a small precollege involvement (from a NASA Space Grant funding perspective) that has the Consortium playing an aerospace STEM-related coordination and facilitation role (management time) to the organizations on each of the affiliate campuses that have primary responsibility for precollege curriculum development, teacher education, outreach, and assessment. The CaSGC has a definitive set of program objectives for the Pre-College area: 1. Provide an active interface between the affiliate institution’s pre-service & in-service professional development programs and NASA education and research resources – The CaSGC is taking the lead to coordinate and facilitate the statewide involvement of California in the newly established NASA *Summer of Innovation Pilot* Program; 2. Actively partner with affiliate campus programs that focus on

encouraging underrepresented pre-college students (minorities and women) to select STEM careers; 3. Partner with and participate in the STEM State and National Standards activities to provide an interface to NASA programs and educational content; 4. Encourage and engage CaSGC Scholarship/Fellowship recipients to partner with K-12 educators in their local communities to entice students to pursue STEM careers; 5. The metrics associated with the Pre-college Program Element are the documented number of active programmatic interfaces with affiliate campus programs described in the four areas above.

Examples of FY2009 CaSGC supported Precollege efforts are as follows: 1. UC San Diego students engaged precollege teachers and students (four San Diego high schools with large minority student populations) with high altitude ballooning program; 2. San Diego Supercomputer Center (SDSC) offers a number of intensive one-week TeacherTECH Science Series workshops for middle and high school educators focused on astronomy and space science; 3. UC Santa Cruz provided Tesla Science workshops for precollege teachers and students; 4. Azusa Pacific STEM Project provided NASA content for middle school teacher professional development and to stimulate student STEM careers (high minority student demographic); 5. Astronomical Society of the Pacific provided K-12 Professional Development workshops on astronomy

NASA Education Outcome 3 Impacts/Results: General Public and External Relations Programs Public Service & External Relations: The CaSGC has taken the position that the Public Service Element would be best served by funding (FY 2009 @ 3.95% of funds) this program area with small amounts of NASA CaSGC funds along with providing considerably more people resources (faculty, students, and research staff). In FY2009 Public Service tasks (Informal Education) was accepted as part of proposed projects under the CaSGC Scholarship/Fellowship, Affiliate Workforce Development, State-wide Undergraduate Research Opportunity Program, and STEM Pipeline Affiliate Projects. The CaSGC Public Service Programs have provided an effective means of promoting an understanding of science, technology, engineering, and mathematics (STEM) disciplines as well as current environmental issues from a scientific perspective.

Examples of FY2009 CaSGC Informal Education projects include: 1. UC Berkeley's "Living with a Star" program at the San Francisco Exploritorium and Lawrence Hall of Science; 2. UC Davis's CalView web project providing Earth science information on climate change and environmental issues; 3. CaSGC's Participation in the San Diego Science Festival; and 4. CaSGC's website for public information and links on NASA content and mission programs.

The CaSGC Public Service Programs have provided an effective means of promoting an understanding of science, technology, engineering, and mathematics (STEM) disciplines. The metrics used to determine success in the state are as follows: 1. Visits to websites; 2. Increases in the number of General Public and student participants; 3. Number of articles and features in the media; and 4. Attendance at community projects.

PROGRAM CONTRIBUTIONS TO PART MEASURES

Student data and Longitudinal Tracking: The FY 2009 CaSGC Student data and Longitudinal Tracking indicates that 177 awards were given for all Program Elements. Of the 177 CaSGC

awards, 40 or 22.6 % were given to female students, 36 or 20.34% to minority students, 132 or 74.6% to undergraduate students, 45 or 25.4% graduate students.

In FY 2009, the number of significant awards (\$5,000 or more) was given to 24 students. Of the 24 CaSGC significant awards, 10 or 41.7% were given to female students, 5 or 20.8% to minority students.

The CaSGC initiated full Longitudinal Tracking in FY 2007. Since only three years (FY 2007, FY 2008, and FY 2009) have been tracked for significant student awards, the majority of students are continuing BS, MS, or PhD degrees in STEM fields. Of those that have graduated, STEM-related non-aerospace companies employ 6 and Aerospace contractors employ. It is anticipated that in the next several years we will see a number of PhD students entering the workforce in industry, at academic institutions, and at NASA.

Course Development: In FY 2009, the CaSGC began a new curricular effort (called *MSI SPACE*) involving affiliates (Minority Serving Institutions) from the California State University System (CSU Los Angeles), the University of California System (UC San Diego), and the Community College System (Pasadena City College and East LA College). The programs major emphasis is on STEM curricula and student – mentor projects (Uninhabited Aerial Vehicles – UAVs) that would target and engage underrepresented minorities in STEM-related education and careers. The *MSI SPACE* team will share facilities, curricula over e-learning networks, and personnel. Example CaSGC course developments include:

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| 1. UC Davis | Earth Resources & Remote Sensing (revised) |
| | The Geography of Bliss (new – understanding ecology data) |
| 2. UC Santa Barbara | Senior Design for optical systems (revised) |
| 3. CalPoly Pomona | ARO 461 & 462 (new – Senior design of aerospace systems) |
| 4. CSU Sacramento | ME 296J (new – Space Systems Engineering) |
| 5. UC Berkeley | Astronomy 10 (revised – Fundamentals of Astronomy) |

Matching Funds: The FY 2009 CaSGC program was structured to respond to a funding profile that has Space Grant funding at \$785,000 with total matching funding at \$2,209,104 (ratio of 1 to 2.8).

Minority Serving Institutions: The CaSGC, in FY 2009, initiated the following steps:

- Instituted a CaSGC MSI Working Group that addresses the recruitment and retention of underrepresented groups (both minorities and women) in STEM careers.
- Aggressively advertised Space Grant scholarship opportunities on each affiliate campus and promote such opportunities to underrepresented science and engineering organizations;
- Promoted partnerships with programs at MSI affiliate campuses that provide resources for underrepresented groups pursuing STEM career paths;
- Assisted in setting up partnerships with NASA Center and industry programs that promote STEM career assistance to underrepresented groups;
- Updated the CaSGC Diversity Plan to reflect the evolving California demographic information and its impacts on MSI;

The MSI Working Group (presently chaired by Dr. Helen Boussalis, who herself is the Director of a Minority University Research Center at CalState LA) is rewriting the CaSGC Diversity Plan and examining the most current demographic data on ethnic and gender participation in California STEM-related higher education and Precollege programs. This management structure allows for continuous engagement of key California MSIs (CaSGC affiliates) in the management, direction, goal setting, and implementation of underrepresented (women and minorities) involvement in CaSGC Program Elements. The MSI Working Group has also begun to address the appropriate involvement of MSI designated community colleges in the CaSGC Program Elements.

In addition to the management changes, the CaSGC has initiated a pilot activity that engages CaSGC affiliate MSI institutions (CSU Los Angeles, CSU Long Beach, and CSU Fresno), several MSI community colleges (largest Hispanic Serving Community Colleges in Los Angeles, Pasadena City College and East LA College), and UC San Diego involving UAV research and shared curricula. The economic downturn in California and NASA has curtailed some of the pilot activities but the program is still progressing. It has significant promise in influencing the higher education pipeline for underrepresented students. It is hoped that this pilot activity will establish a model that can be propagated throughout California and the nation.

A second project is a joint effort between the Maine Space Grant Consortium and the CaSGC affiliate, CSU Long Beach, that involves minority students from Maine and California working on the development of a high performance rocket designs and science payloads. This multi-consortia partnership has impacted a number of minority students from Maine and California.

IMPROVEMENTS MADE IN THE PAST YEAR

In FY 2009, the CaSGC updated its Strategic Plan, including its diversity strategies and organizational management structure. The new management structure not only stimulates active and continuous involvement of all of the CaSGC affiliates but also allows for the lead institution management to focus on forming strategic partnerships with other private-public institutions, to develop other funding sources, maintain a strong focus on the national Space Grant goals and objectives, and make sure the CaSGC impacts are aligned with the needs of NASA and California.

In FY 2009, a dedicated effort was given to actively engage as many CaSGC affiliates, particularly those institutions that are designated as Minority Serving Institutions (MSI), as possible in the STEM workforce projects. In regard to affiliate management, we reviewed each of the affiliates in terms of participation and made changes in campus directors/coordinators where it was determined that improvement was needed.

The CaSGC instituted the new **Statewide Undergraduate Research Opportunity Program – in FY 2009**. The CaSGC Statewide Undergraduate Research Opportunity Program provided research experience opportunities to 39 undergraduate students attending CaSGC affiliate institutions. The difference between this and other CaSGC scholarship programs is the projects are student-driven; the students conceptualize the projects, find a mentor and apply directly to CaSGC headquarters for funding.

In the later part of FY 2009, we have renewed our efforts at the pre-college area of the STEM pipeline. We have formed partnerships with the California Mathematics and Science Projects (17 K-12 STEM professional Development and curriculum sites throughout California) to provide NASA-related content into those efforts. This effort was used as the bases for the CaSGC proposal to the NASA Summer of Innovation program. Those partnerships will continue in the future.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

CaSGC Affiliate	Institution Type	Key Characteristics
UC San Diego	Lead CaSGC University	Research University offering BS, MS, PhD
UC Los Angeles	CaSGC University	Research University offering BS, MS, PhD
UC Berkeley	CaSGC University	Research University offering BS, MS, PhD
UC Davis	CaSGC University	Research University offering BS, MS, PhD
UC Santa Cruz	CaSGC University	Research University offering BS, MS, PhD
UC Santa Barbara	CaSGC University	Research University offering BS, MS, PhD
UC Irvine	CaSGC University	Research University offering BS, MS, PhD
UC Riverside	CaSGC University	Research University offering BS, MS, PhD
Stanford University	CaSGC University	Research University offering BS, MS, PhD
Santa Clara University	CaSGC University	Research University offering BS, MS, PhD
Univ. Southern Calif.	CaSGC University	Research University offering BS, MS, PhD
CSU Long Beach	CaSGC MSI University	4-year University offering BS, MS
Univ. of San Diego	CaSGC University	Research University offering BS, MS, PhD
CSU Los Angeles	CaSGC MSI University	4-year University offering BS, MS
CSU Sacramento	CaSGC University	4-year University offering BS, MS
CSU San Bernardino	CaSGC MSI University	4-year University offering BS, MS
CalPoly SLO	CaSGC University	4-year University offering BS, MS
CalPoly Pomona	CaSGC MSI University	4-year University offering BS, MS
San Jose State	CaSGC University	4-year University offering BS, MS
San Diego State Univ.	CaSGC University	4-year University offering BS, MS
Pomona College	CaSGC University	4-year University offering BS, MS
CSU Fresno	CaSGC MSI University	4-year University offering BS, MS
Azusa Pacific Univ.	CaSGC University	4-year University offering BS
Grossmont - Cuyamaca	CaSGC Community C.	2-year Community College
SD Supercomp. Ctr.	CaSGC affiliate	Research Center at UCSD funded by NSF
Astro Soc. Of Pacific	CaSGC affiliate	Astronomy Research & Education Resource

In addition to the CaSGC Affiliates and their contributions to all of the CaSGC Program Elements, a number of other private and public institutions have played significant roles in the execution of the following CaSGC projects:

CaSGC Project Name	CaSGC Partner	Role in Project Execution
1. ARC Education Associates	SGEEI & NSGF	Provided management services
2. UCSD UAV Project	Gen. Atomic	Industry mentors & funds
	Northrop Grumman	Industry mentors & funds
3. MSI SPACE Project	Pasadena City College	Manages minority students
	East LA College	Manages minority students
4. ARC Space Portal	SGEEI	Mentors & funds
	Commercial Space Ind.	Mentors & funds
5. COTS Program	SpaceX & SGEEI	Mentors, management, & funds
	NASA Ames	IPA Mentor
6. Balloon Projects		
7. Biotech & ISSNL	BioCom Industry	Mentors & funds
	SGEEI	Management & funds
	NASA Ames	Mentors & funds
	NASA JSC & Boeing	Mentors & resources
8. Rocket Projects	Garvey Space	Mentors & funds

9. San Diego STEM	Flometrics, Inc. NASA MSFC SD Science Alliance BioCom Institute SGEEI	Mentors & funds Mentors Mentors & funds Mentors & funds Management & funds
10. Remote Sensing Project	UC Office of Research UC Davis Water Resources Agency	Funds & Management Facilities & mentors Mentors & resources
11. SmallSAT-CubeSAT	ULA Boeing Northrop Grumman Lockheed	Mentors & resources Mentors & resources Mentors & resources Mentors & resources